Shortage of Brainpower

posing intellectual conformity, it calls urgently for men who can think for themselves.

• By increasing production faster than population growth, it solves the problem of satisfying man's physical needs. As a result, it's bringing greater potentialities for improvement of human talents—for their employment both at work and after work—and for their extension to a broader share of the entire population than ever before. Modern industrial society is the first that promises to extend these opportunities to everybody.

This double effect of the modern industrial system—which puts human brainpower on the highest pedestal—isn't some vague future possibility, some wishful thinker's daydream. It has already struck the American society with a force that few comprehend; and it cannot be checked. It's rapidly multiplying the urgent need for highly educated, creatively intelligent men—and multiplying it so fast the educational processes can't catch up.

Even if Americans were content to rest on their present attainments, it might be national suicide—in a period of competitive coexistence and cold war—to stay at that level. The real foundation for the nation's strength is human knowledge. The need for more people with knowledge has already become evident in every area of American life.

I. Where the Need Is

There's hardly anyone today who hasn't bumped his head against some specific aspect of this spreading need for educated talent. But these aspects are so varied that few have realized the impact in its totality. Each area feels its own critical need:

• Business and industry—for scientists, engineers, managers, highly trained technicians.

• Government—for these, and for people skilled in social sciences, international relations, languages, public administration.

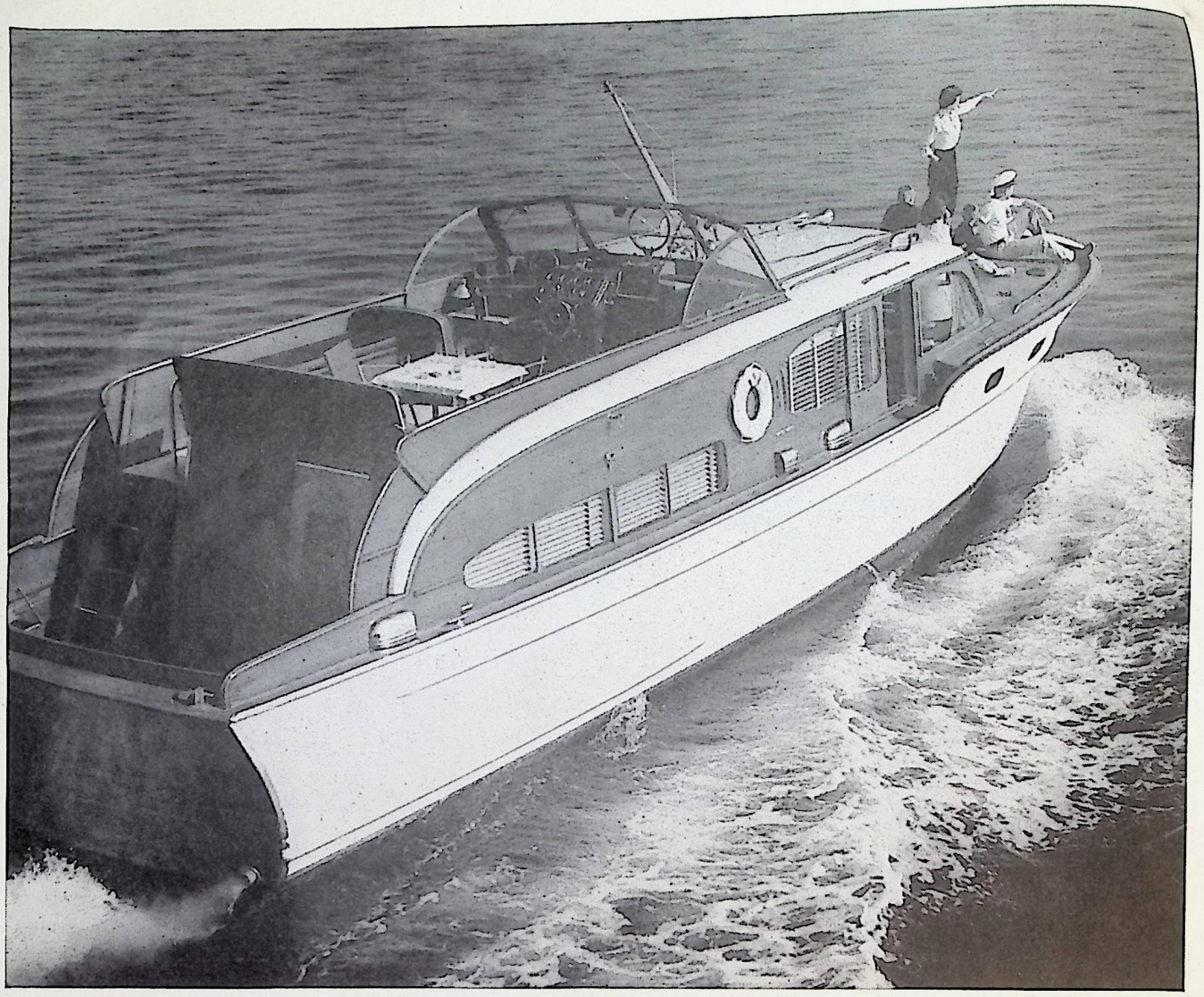
• The Armed Forces—for highly trained officers, enlisted men, and civilians able to develop and operate a more and more complex war machine.

• Public and secondary schools—for competent teachers.

• Colleges and universities—not only for gifted teachers, but for really creative thinkers and researchers.

• And the entire society—for outstanding organizers and cultural leaders—those who set the goals that stir others to their best efforts.

One symptom of the over-all need is the cacophony of charges that skilled engineers are wasting their time on



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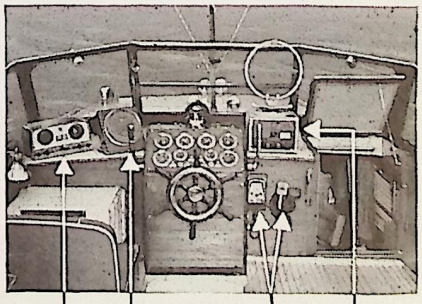

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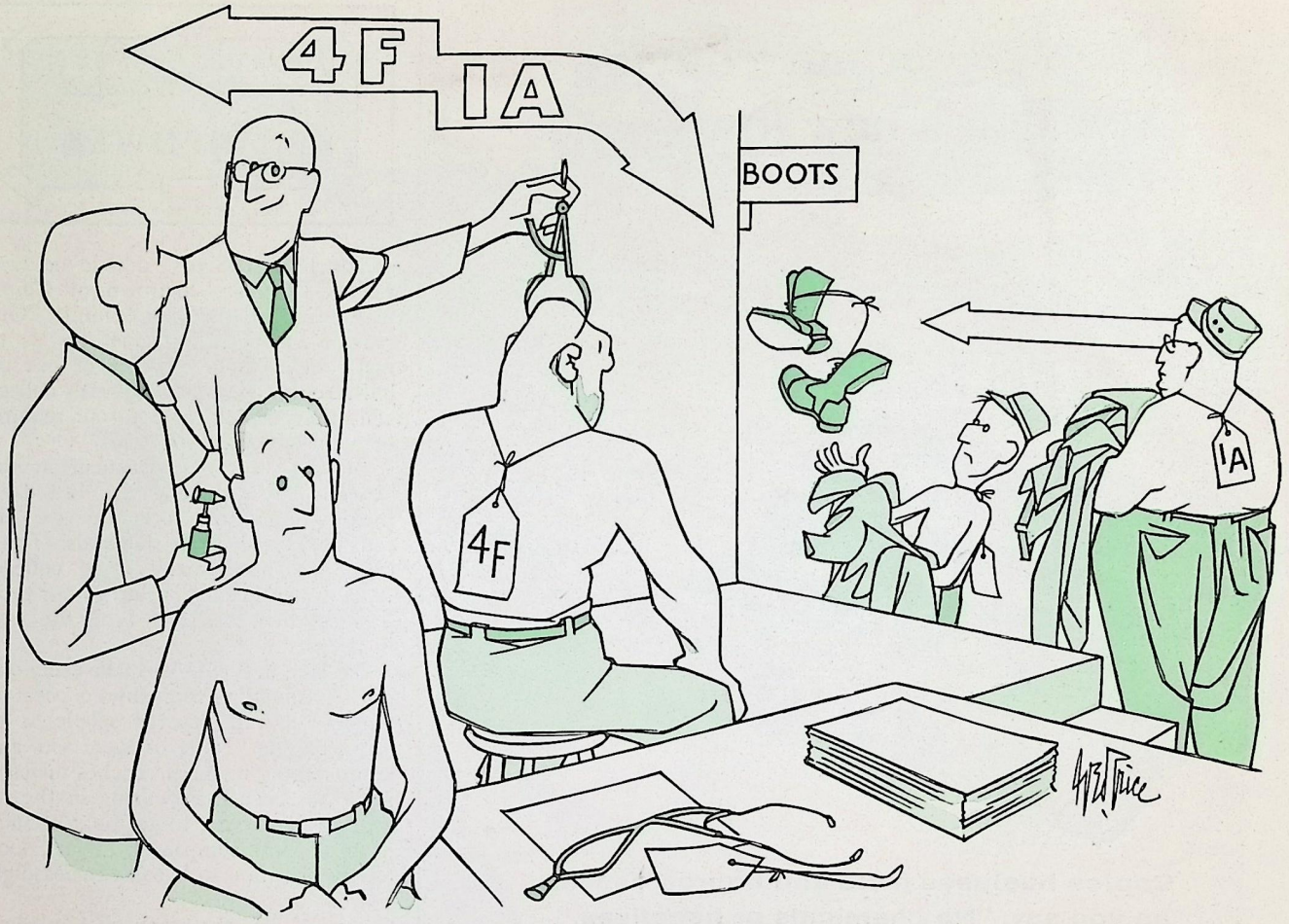

The Armed Forces need men suited for a more and more complex war machine.

technicians' jobs, that highly trained people are being "drained away" to other jobs—teachers into industry, engineers into management, fundamental scientists into applied research, and so on—or that companies are "hoarding" scientists and engineers and managers away from each other.

• **No Passing Phase**—Most people assume all this is simply a phenomenon born of the economic boom, and wonder if it will evaporate if the economy slips down to a slower pace. That could of course happen—as a short-run development. But the growing need for educated talent is founded on a more durable base than the short-run business cycle.

It's true that during and just after the war the shortage was indeed regarded by many experts as a transitory phase. Immediately after the war, there was a revival of the depression-born notion that we were training too many engineers, too many mathematicians and other "intellectuals." There were fears that this might set the stage for a nasty social explosion by these educated but unusable groups—as in the Fascist and Communist movements in Europe before World War II.

Such fears proved to be nonsensical. The demand for educated people, far from contracting as the extreme wartime needs tapered off, actually continued to grow—through prosperity and three moderate postwar recessions. There's every evidence that it will go on growing in the years ahead.

How Business Sees It

Nobody knows better than U.S. industries how steeply the need for educated people has been rising. This is abundantly clear from the responses made by over 100 leading U.S. companies to a question put by BUSINESS WEEK. Company after company confirmed the trend.

The companies responded to this question: "How many more trained people—say, those with a college education or its equivalent—do you need today to run your business successfully than you did 10 or 20 years ago?"

Here are some representative company answers:

• **Ford Motor Co.**: "As far as persons actually holding college degrees, we now employ approximately five times as many as we did 10 years ago."

• **Carborundum Co.**: ". . . 100% greater as compared with 10 years ago. A college education is a normal requirement for practically all new employees in management, sales, staff, research, and engineering jobs."

• **Chas. Pfizer & Co.**: "During the past 10 years our staff of trained people has increased by over 500%."

• **Thiokol Chemical Corp.**: "We need 20 times as many technically trained people to continue in business today as we did 10 years ago."

• **International Nickel Co.**: "Three to four times as many."

• **Air Reduction Co.**: "Five to six times as many."

• **Armstrong Cork Co.**: "Since Armstrong has been a heavy and continuous employer of college graduates for the past 37 years, the increase in our need for trained personnel in the last 10 or 20 years would perhaps be less than for a great many companies. But we need more today. The best measure is the size of our training classes. Our 1956 class of college graduate trainees was two and one-half times the size of the class 10 years ago, in 1947, and four times the size of the class 20 years ago. . . ."

Many companies couldn't give a specific answer to the question because they have grown so much or changed

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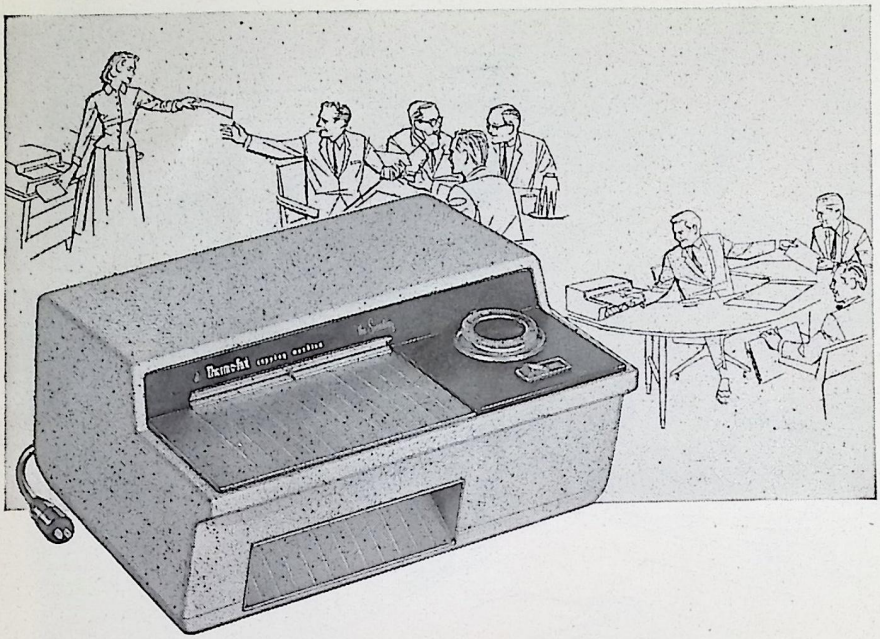

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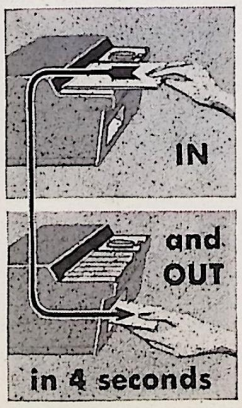

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Story starts on P. 176

so much in the past decade or two. Lucius D. Clay, chairman of Continental Can Co., said, for example: "Our growth has been too great for us to make an accurate estimate of our requirements today for men with college educations as compared to our requirements of 10 or 20 years ago."

But he went on to concur in the general view, in these words: "In today's highly competitive economy we are constantly raising our standards. Thus, today we need many more college-trained men in relationship to our total business than has ever been the case in the past."

• **No End in Sight**—Virtually every one of the responding companies expects its hunger for well-educated people to go on increasing. None of them sees any letup coming in the headaches management has been experiencing in the recent past in trying to get hold of such people. Most companies, in fact, look for the situation to become increasingly worse.

Typical of the somewhat gloomy business view of what's ahead is this rather restrained comment from Anthony G. De Lorenzo, a General Motors vice-president: "In the past few years it has become increasingly difficult to meet our needs, particularly in the engineering and scientific fields. I do not know of any development that holds out promise for an early easing of the situation."

• **Varying Hungers**—The specific spots in which the shortages of educated people are most acute vary from company to company—depending on the company's main activity and where it's making its biggest efforts right now.

Pfizer, for example, said it's especially hungry for pharmaceutical chemists, pharmacologists, and research chemists with Ph.D.s—and for sales people with technical training in chemical and agricultural sales. At Bendix Aviation Corp. (a company that lives on engineering), the major shortage is engineers.

Others have different needs:

• The Burroughs Corp. has been pushing out new products fast—so its biggest problem is sales, its biggest shortage is in sales personnel.

• AC Spark Plug Div. of General Motors is doing a lot of original research on electronics. Its sharpest need is idea men.

• Wyandotte Chemicals Corp. is still expanding its management; its

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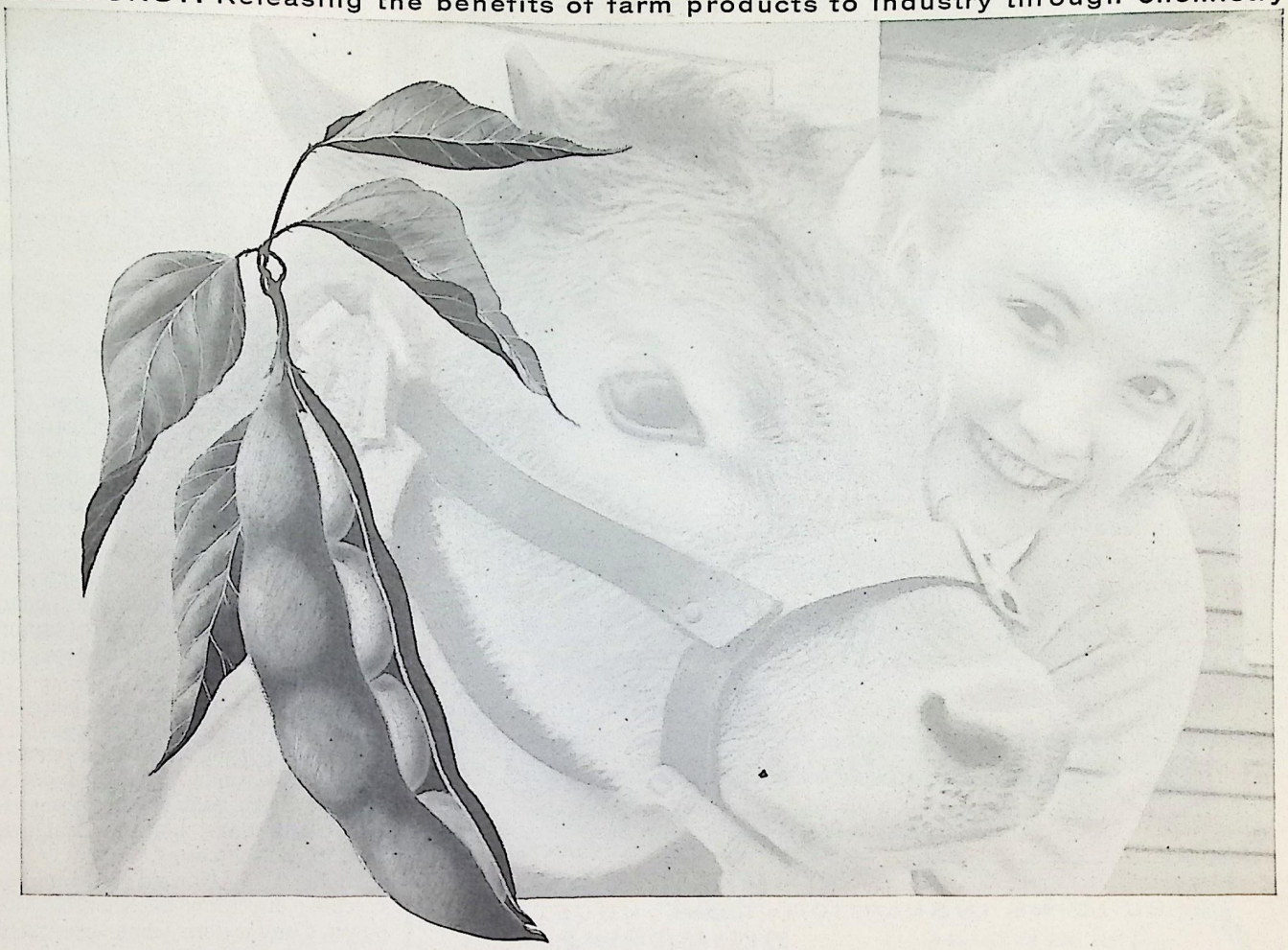

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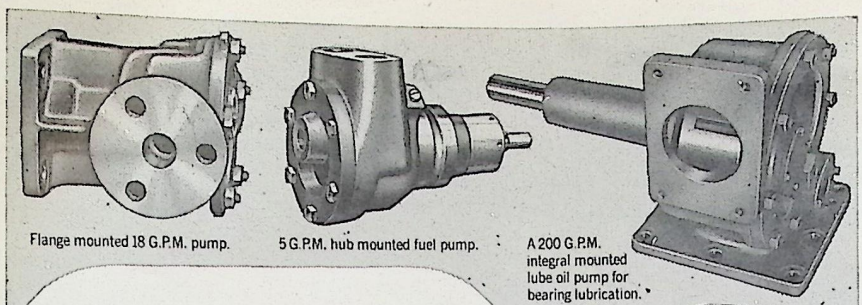

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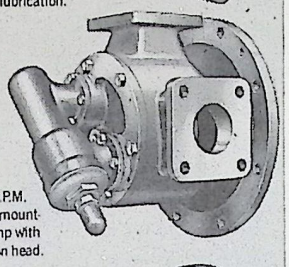
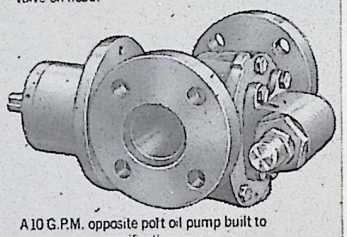


A 90 G.P.M. flange mounted pump with valve on head.



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greatest need is for engineer-managers.

• Great Lakes Steel Corp.'s needs run in the same direction.

Continental Can, on the other hand, doesn't limit itself; it says it's always looking for good people right across the board—as plant and sales managers, qualified engineers and scientists, food technicians, economists, industrial engineers, industrial relations experts.

But all this is still only a beginning on the list of what's needed. Banks and other financial institutions are short of lawyers, most big businesses are short of accountants to take on complex tax problems, mathematicians to handle electronic computers, business administration graduates for management training programs.

• **Supporting Cast**—If you go below the college-educated level, the scarcity of trained supporting technicians is just as acute—some would say even more so. Indeed, that's part of the reason for the engineering shortage: Engineers have to do technicians' work.

In the U.S.—Howard A. Meyerhoft, executive director of the Scientific Manpower Commission, points out—there's just one supporting technician for every three engineers. This reverses the situation in Europe, where there are three supporting technicians for each engineer.

Massive Upgrading

What's happening, in reality, is a massive upgrading of the skills required of the entire U.S. labor force. That focuses the manpower problem, to put it in broad terms, on the whole group in the population that's capable of exercising human intelligence, judgment, imagination—or even personal charm.

• **Chain Reaction**—The reason becomes clear when you look at the way the whole industrial system operates in its complex current version. You start with the people who create new ideas, the scientists—and they're desperately short. Then you need people to engineer these ideas into things or processes—and they are also in short supply.

The next step calls for men who can assemble, organize, and direct the people and the money and the equipment for getting the engineered ideas into production. And managers—especially those able to see how all parts of the process can best be put together—are mighty scarce.

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Then you need workers. The kind that can design or make or repair the machines are in hot demand; but the ones that just work along with the machines, or are doing work that machines can take over, are not. When the goods are produced, they have to be marketed—and salesmen, sales girls, advertising men are in short supply, too.

Finally, in the background of the whole process, are the people who have to train all these others—and those who do the research that helps make the work at each step more efficient. These, too, are scarce.

• **Men, Not Machines**—The reason for all this is that the flow of new ideas has been fast and furious. They are ideas that do make obsolete the human types who, in their functions, resemble machines. But they put tremendous demands upon those who are capable of thinking and acting with the intelligence that is the special mark of human beings.

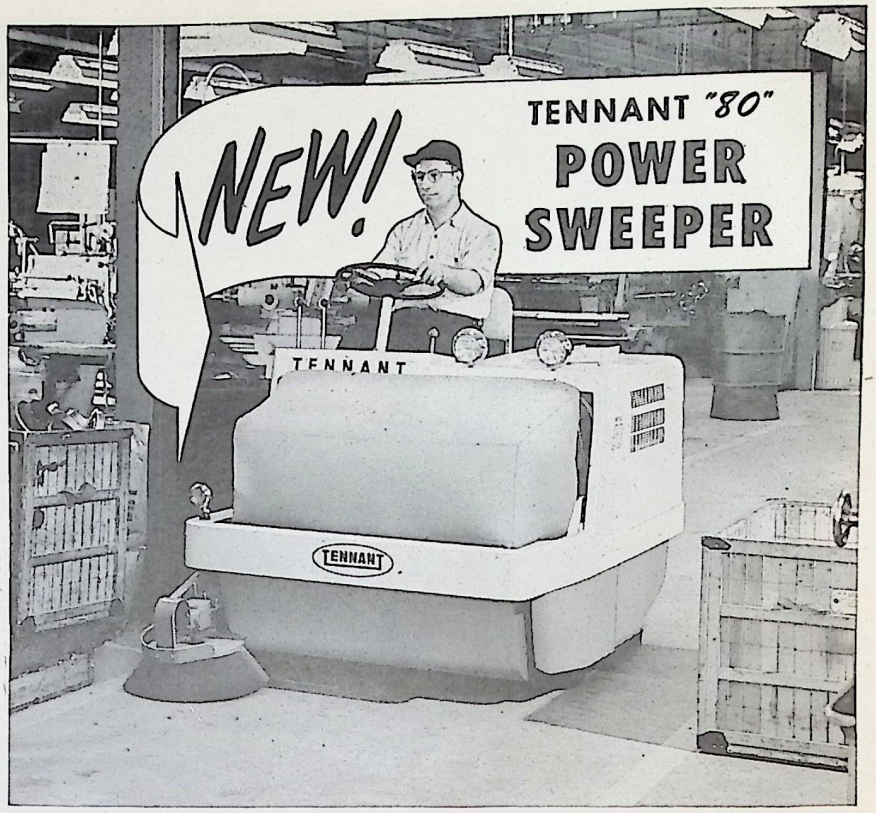
Glimpse of the Future

This view of what's going on is supported by some forecasts by the U. S. Labor Dept. of changes in the relative standing of brain and brawn in the work of the future. The Labor Dept. has made careful projections of employment trends of major occupational groups for a decade ahead.

For the period 1955-1965, the department finds that the fastest employment growth will be among professionals. In 1955, this group numbered 5.7-million. By 1965 it should add another 2.1-million—a 37% increase. Says Asst. Secy. of Labor Rocco C. Siciliano: "There is real need for expansion in many of the important groups here—the 1-million workers in engineering and science, the 1½-million in teaching, and the 1-million in medical services—doctors, dentists, nurses, and so on."

• **From Blue to White Collars**—All the white-collar groups—managers and clerical and sales people as well as professionals—will grow rapidly. This year, Siciliano points out, the white-collar group as a whole reached an historic turning point—it became the biggest single segment of the labor force, outnumbering the blue-collar workers for the first time. The white-collar wearers now number about 25-million. By 1965 they will grow by another 5-million.

But laborers will not add to their



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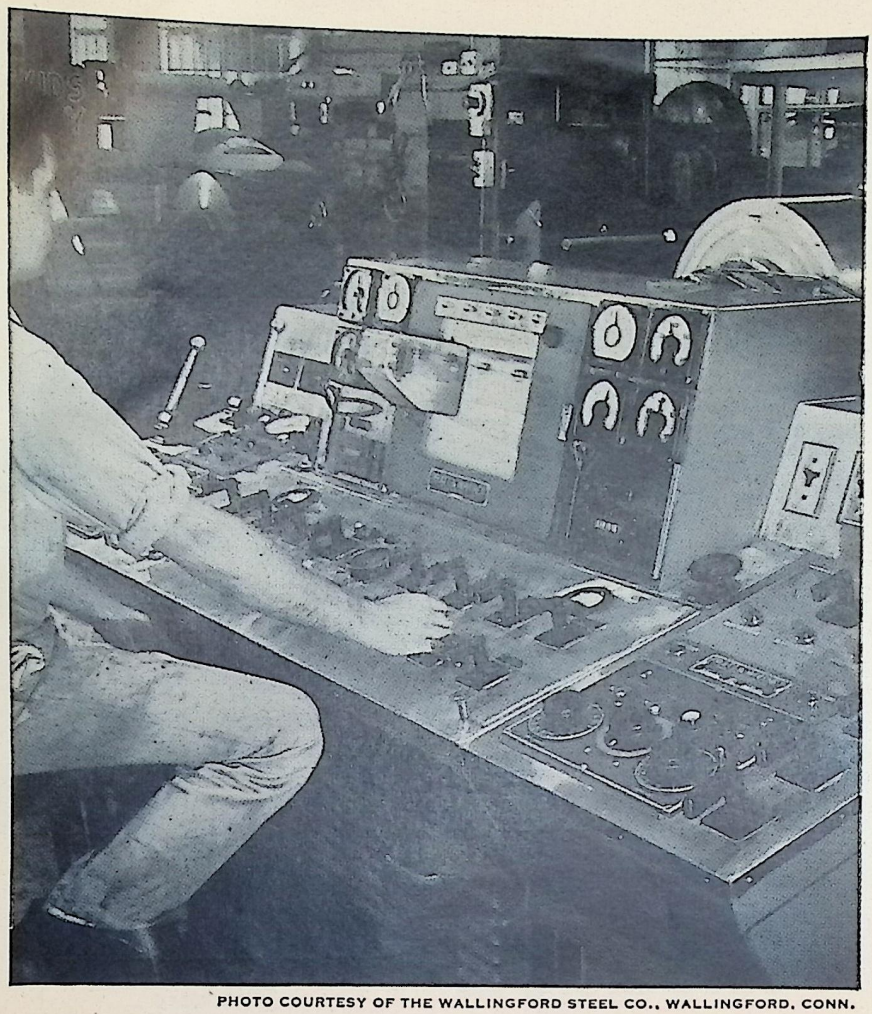

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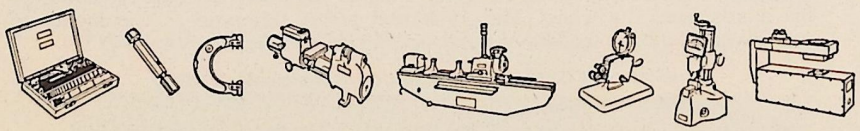

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ranks in this coming decade; so as a percentage of the expanding labor force they will diminish. Farmers and farm workers (now counted at about 6-million) will actually decline in numbers, losing about 1-million of their present total, the Labor Dept. figures.

• **Clear Trend**—Of course these Labor Dept. estimates, like all projections of future growth, are rough calculations—based on the assumption of a gross national product in 1965 of $560-billion (in 1955 dollars) and a labor force of 74-million.

But whatever the errors in detail—and there are bound to be many—the central point stands out undeniably: Industrial evolution is creating a tremendous demand for far better trained, and more widely dispersed, human talents.

Why Machines Need Brains

How explain this striking trend? There can't be any simple explanation of such a complex and many-sided development—but you can track down some of the main elements that contribute to it:

More complicated machinery does two things. On one side, it takes the place of slow and inefficient human functions and abilities, such as pulling, lifting, walking, remembering, measuring, seeing and hearing, spreading information. **On the other, it stimulates enormous demands for other human faculties involving thought and imagination**—valuing, judging, sensing, spotting relations between the apparently dissimilar, generalizing—and creating.

Today's complex machines perform the first set of functions with an astronomical increase in efficiency as compared with humans. But even the most fantastically complex mechanical monsters can exercise or simulate the second group of human faculties at only a relatively primitive level. Just to keep the two areas in balance greatly magnifies the need for the human exercise of these talents.

The speeding up of technological developments breeds a mounting need for even faster scientific and technological growth. As everyone consumes more energy, more natural resources, the easily available supply provided by nature dwindles more sharply. So we call on science and technology to supply us with the materials and energy required

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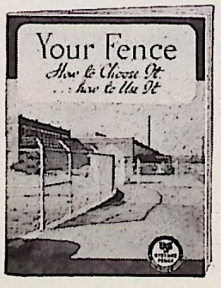

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by a rising population bent on higher standards of life.

Technological and scientific progress force human knowledge and skills into greater specialization in every field. The biologist splits into the biochemist, the biophysicist, the geneticist, the embryologist, and so on—the general practitioner into the cardiologist, the gynecologist, the obstetrician, the pediatrician, the internist. And so it goes in every line.

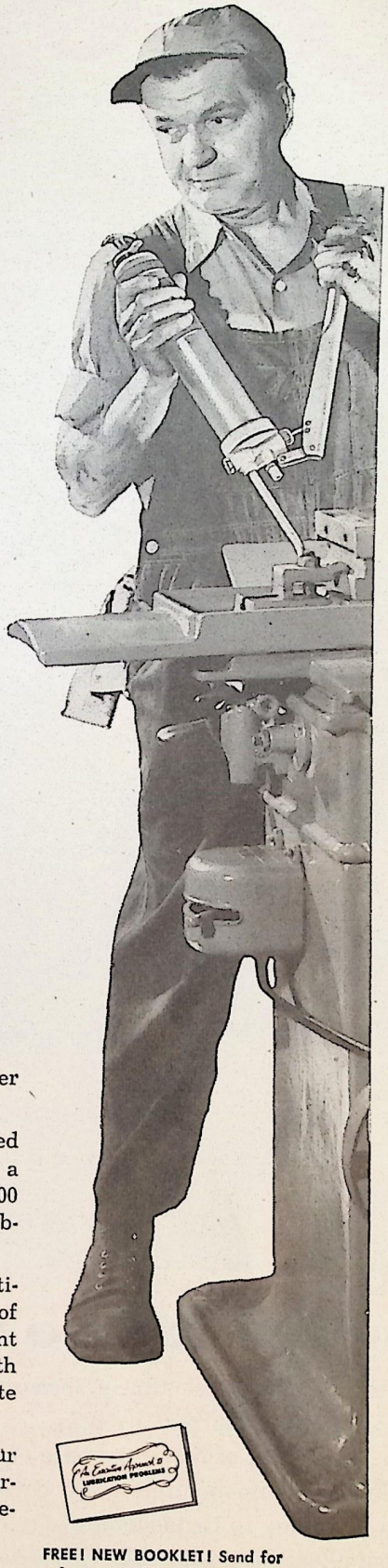
This increasing specialization, in turn, produces a counter-need—for the integrating generalist, who can master a broad area taking in many specialties, so as to combine their achievements for wider application. The specialties, indeed, become so diverse, and so ingrown in their individual pastures, that this integrating generalist may turn out to be the rarest and most valuable talent of all.

What's likely to be more and more needed—as specialties multiply faster than the supply of outstanding specialists—is the development of men who are highly skilled not so much in any single specialty as in scientific processes as such. Then these men can turn quickly from one research field to another, trusting the more routine gathering and storing of information to others—or to machines.

International conflict adds to the demand for educated talent. In an industrial age, military prowess largely depends on technological mastery. It's beyond doubt that many recent advances in atomic energy, electronics, aeronautical engineering, chemistry and biochemistry, and so on, were in part byproducts of international struggle—first, in World War II, against the Nazis and Japanese; later, against the Communists.

• **Interrelated**—But it would be oversimplifying to attribute all recent technological advance to international conflict. Particular branches of science have a sort of life and growth of their own. Basic new discoveries often seem to sprout—and in many widely scattered laboratories—when the scientific soil is prepared for them. And many other factors—economic, social, political, demographic—bear upon the rate of technological progress.

All these factors act upon each other. Technological development sparks new investment, stimulates rising national income. Rising income helps stimulate population growth. Population growth



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requires more public and private construction, increased production, and—to maintain living standards—greater productivity. This rounds out the circle by stimulating further technological progress.

The cycle doesn't depend on war or international conflict—certainly not after it has once got rolling.

Unpredictable Force

No one can describe precisely all the elements making up this new force that has struck U.S. industrial society with such powerful impact, opening up such an insatiable demand for special skills, managerial abilities, creative gifts. That does not make the force any less real.

Nor can anyone say for sure just how long this cry for educated talent will be heard, nor how loud it may become. That will depend on the quality and number of talents that the country can marshal to meet the present demand and keep step with its growth.

Because future needs will depend on still unborn discoveries, no one can really foresee just what kinds of educated people will be most urgently required in the years to come, or from what particular lines of activity the loudest calls will be heard. All we can be sure of is that, as time goes on, we will be scouting around for more and more such people.

And the job of getting them in large enough numbers and sufficiently high quality to meet the swelling demand—especially in the period just ahead—is going to be rough.

II. Supplying the Brains

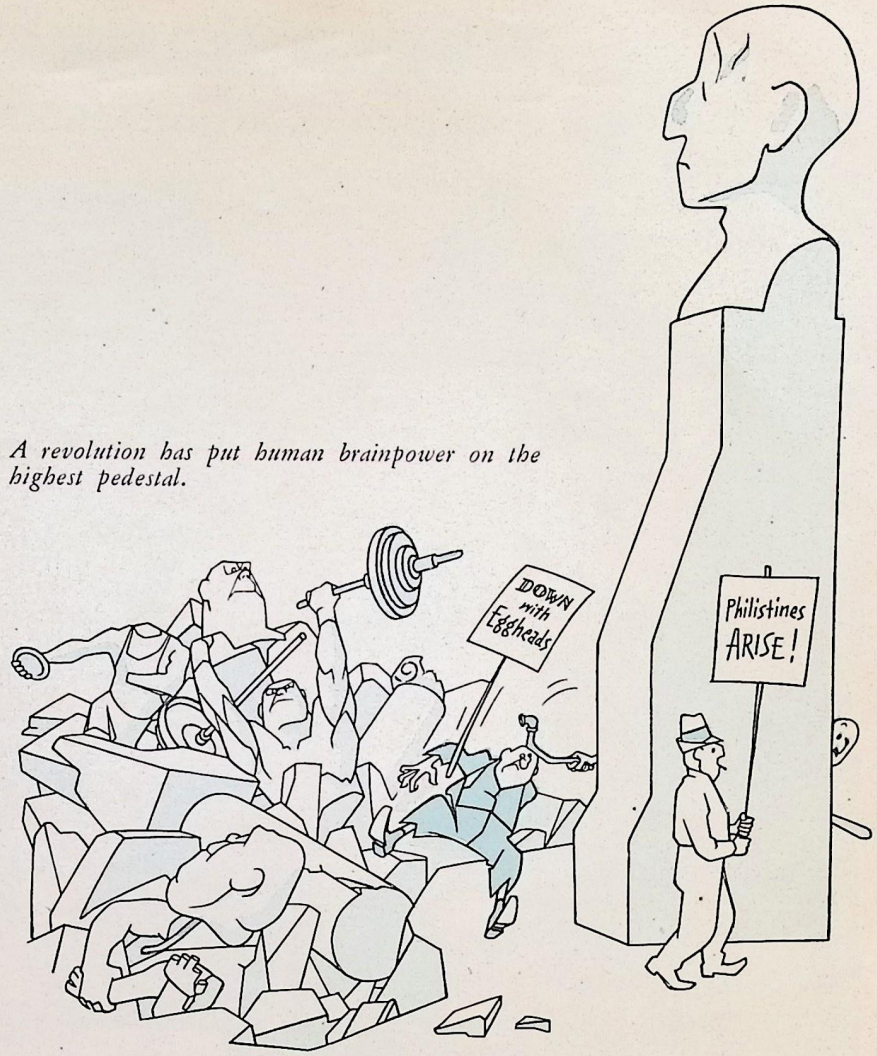
For the immediate future, the outlook isn't too hopeful.

During the 1920s, the U.S. birth rate averaged 25 per 1,000 of the population. With the onset of the Depression, it began sliding downward. For the whole decade of the 1930s, it averaged only 19 per 1,000. It rose a bit during the war—and really climbed when peace came. Since World War II, the birth rate has averaged nearly 25 per 1,000.

The combined effect of this dip and rise in the birth rate puts a squeeze on the supply of trained people, and will greatly hamper efforts to meet the demand in the coming decade.

• **Hollow Generation**—On one side of the picture is the "hollow generation" of the Depression years, now coming of age. Its comparatively small numbers have been limiting the size of recent college classes, and will continue to hold down the college population for a few years more.

The same thing is true of the labor force. Total U.S. population is growing rapidly, because of current higher birth rates and lower death rates. But the baby drought of the 1930s is checking the expansion of the labor force in the most productive age group—those from 25 to 44.



A revolution has put human brainpower on the highest pedestal.

The Labor Dept.'s projections for the 1955-65 period hold out no hope for any near-term change in this situation. The department sees the number of men and women in the labor force in the 25-to-44 group staying about the same, while total population gains 27-million in the decade, reaching 193-million by 1965. In 1960, in fact, there are likely to be a half-million fewer men between 25 and 34 in the labor force than there were in 1955.

These are the age levels, roughly speaking, where companies will be looking for bright young talents for future development.

• **Oncoming Horde**—On the opposite side of the picture are the bumper baby crops of the postwar years, which—as everyone knows—are now beginning to put a severe strain on the U.S. educational system. In the period just ahead, this strain will become even more intense.

You only have to look at the Labor Dept. estimates of the increase in school enrollments in the 1955-65 decade:

• In elementary schools, 8-million more children—a 30% rise.

• In high schools, 12-million more—a 60% jump.

• In colleges, 2-million more students—a climb of 75%.

Pressures on the Schools

The pressure of this gigantic oncoming tide of youth on the educational system is going to do two things:

• It will put terrific demands on the specialized talent that must be "ploughed back" into educating the new generation—and hence will not be available for work in industry, government, or research.

• Unless ways can be found quickly to prevent it, this pressure will bring a deterioration in U.S. educational standards—thus aggravating still further the shortage of high-quality graduates of our schools, colleges, and universities. The danger is already being compounded by the inability of schools and colleges to compete with industry for new college graduates.

• **Teacher Gap**—The Ford Founda-

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Executive after executive reeled off prescriptions for the care and feeding of intellectuals.

tion's Fund for the Advancement of Education has made a calculation of the number of teachers that will be needed. It figures that in order to maintain present pupil-teacher ratios and to provide for replacements and expansion, U.S. schools (below the college level) will have to find 16 new teachers between now and 1965 for every 10 now teaching. That's equivalent to replacing all the teachers we now have and finding 60% more.

For colleges, it will be even tougher. To maintain the present average ratio of 13 students to a teacher, U.S. colleges would have to scrape up by 1970 between 16 and 25 new professors for every 10 they now have.

Look at it the other way round, and it's even more startling. It means that over the next 10 years we would have to take 1.9-million college graduates—half of the 3.7-million total that's expected to come out of the colleges—just to meet the need for new teachers. As things are, only about one-fifth of all college graduates go into school or college teaching.

• **Threat**—The effect on educational standards could be serious. Today two-fifths of U.S. college teachers hold Ph.D. degrees—which are certainly a measure of the amount of training, if not of qualitative merit. But by 1970, the Ford Foundation estimates, only one-fifth of the college teachers may be Ph.D.s.

If educational methods remain about what they are, and more poorly prepared teachers must face much larger classes, the decay of standards could be cumulative.

In high schools the effect on standards is already even more ominous—and many observers regard improvement in the high schools as the really crucial point, the key to an increase in the number of those able to go on to difficult scientific work in college.

In the five years from 1950 to 1955 there was a sharp drop in the output of new high school teachers in important subjects:

• The output of teachers of mathematics declined by 51%.

• In teachers of industrial arts, the drop was 54%.

• In science teachers, the decline was 57%.

As the shortage of qualified teachers mounts, more emergency teachers are hired, and more children get part-time schooling on double sessions.

What Kind of Training?

Nearly everybody is willing to concede that the U.S. faces one of its toughest and most fundamental problems in this question of how to handle the oncoming flood of new elementary school, high school, and college students—and how to provide them with the upgraded education that's demanded by the growing complexity of science,

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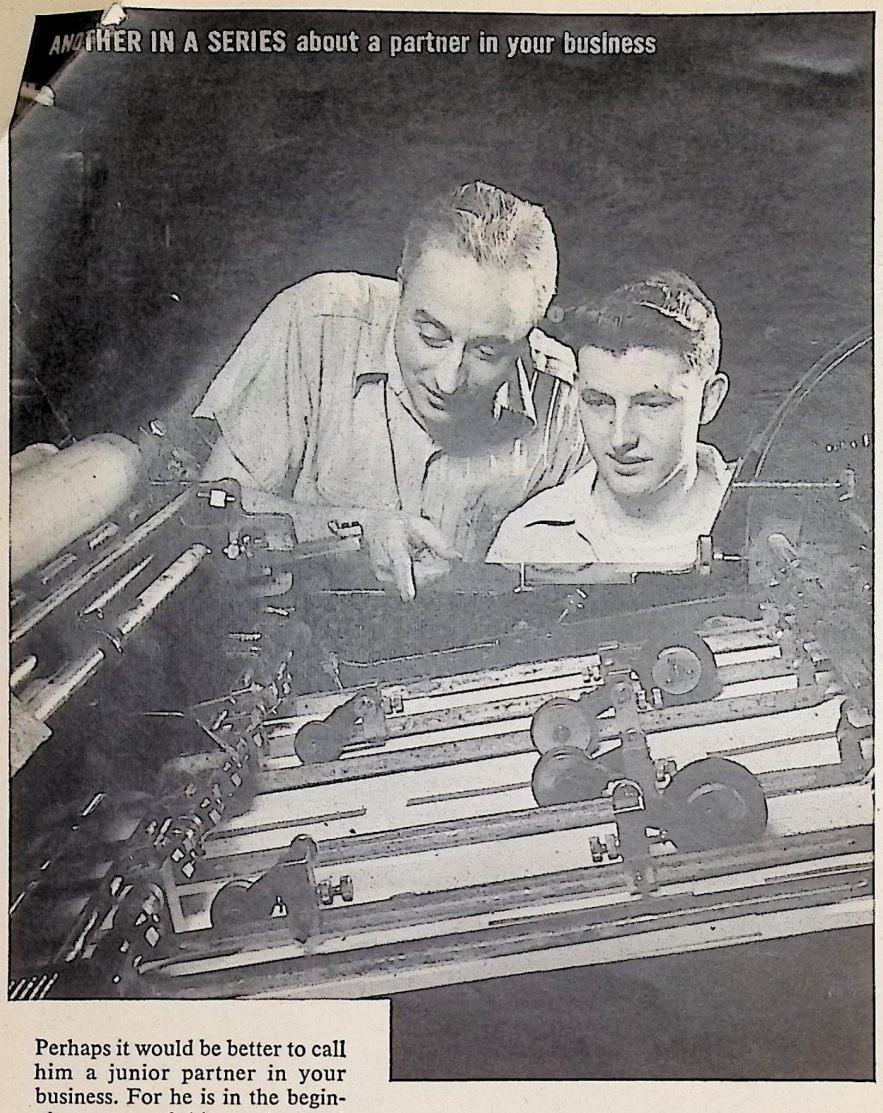

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Story starts on P. 176

technology, and the whole economy.

But nobody yet has the answers.

In fact, there's sharp disagreement and hot argument, among educators and laymen alike, over how to go about the job.

• Some—among them, the heads of the Fund for the Advancement of Education—would seek ways of rapidly increasing the productivity and effectiveness of each teacher, by some method such as the use of educational TV. Others fear that these "mass media" techniques would only debase standards still further.

• Some call for establishing a larger and larger number of colleges and universities to keep up with the number of students seeking entrance—and for spreading the best teachers, and students, too, more evenly throughout the nation. Others contend that the students who come to, and cling to, the best institutions are doing the smartest thing. Whatever the aggregate needs of society, they say, this makes for quality, and quality is the most important thing of all.

• **Advocate**—This is a hotly debated point. Lee DuBridge, president of California Institute of Technology, presents one argument for concentrating the best students in the best schools.

"I understand," he says, "that over half of the top men students of the country who won National Merit Scholarships—300 or so boys of really top ability—chose to go to about a half-dozen universities and institutes of technology, all of which are generally recognized as being the most difficult in the country to get into. Those smart boys were smart enough to know that if they were smart enough to win a scholarship, they ought to go where the smartest students are to be found."

Some complain that this is unfair to smaller and less famous colleges, DuBridge says, adding: "But I say it is unfair to the other 50% of those smart boys if they go to institutions where they will never have the competition required to develop their talents." He might even suggest, he went on, that the Merit Scholarship Board should not allow any winners in the top 1% to use their scholarships except at a "select few of the institutions of the country" with proved capacity to give full challenge to top talent.

• **Other Proposals**—There are other widely debated suggestions for strength-

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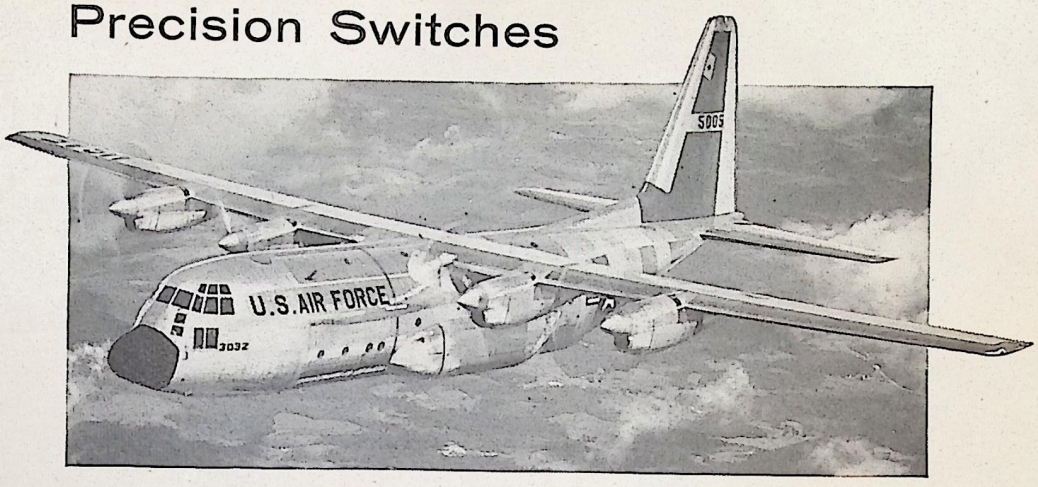

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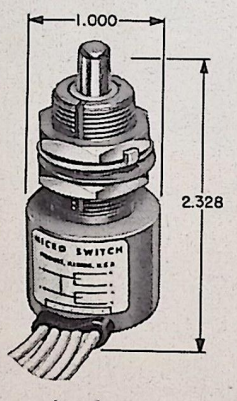

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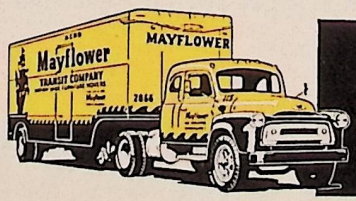

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ening education to meet the new challenge:

• Some see the only solution in heavy federal outlays to improve schools, raise teachers' salaries, provide more scholarships for the able (at present, the Fund for the Advancement of Education found, more than one-half of the ablest youth doesn't get to college). This brings loud cries of opposition from others, who feel that large-scale federal aid is bound to produce corrosive effects on the range and variety of education, and might in fact limit its freedom.

• Some—Rear Adm. H. G. Rickover is one—argue for special schools for especially bright youngsters. Others condemn this as an undemocratic and unnecessarily narrow way of trying to develop the educated talent we need.

• **Lag in Action**—The arguments wax hotter, but as yet they have led to little action, despite endless committee and commission inquiries. This lag in action is strong evidence that the American people haven't yet taken the problem quite seriously.

Some interested observers, both educators and businessmen, point out that this lag isn't unusual—it commonly takes a crisis to rouse the American people to strong action. But they are afraid that in this case such a crash-program approach may not be enough.

It takes a long time to build a school and college and graduate school system that can turn out a large supply of highly competent specialists. And that's not all, as these observers see it. Any real solution to the brainpower shortage, they say, will require a certain shift in social values—one that will attach the highest social prestige, not to speak of higher financial rewards, to the trained specialists and the educators who help to develop them.

Brains on a Pedestal

Any swing in values that would put brainpower on society's highest pedestal would be a long-range proposition, of course. But signs abound—many turned up in the responses to BUSINESS WEEK's survey of leading companies—that some cultural shift toward greater respect for educated talent may be at hand.

"Important changes bearing on the position of the scientist and engineer," says H. Gershinowitz, president of Shell Development Co., "are already taking

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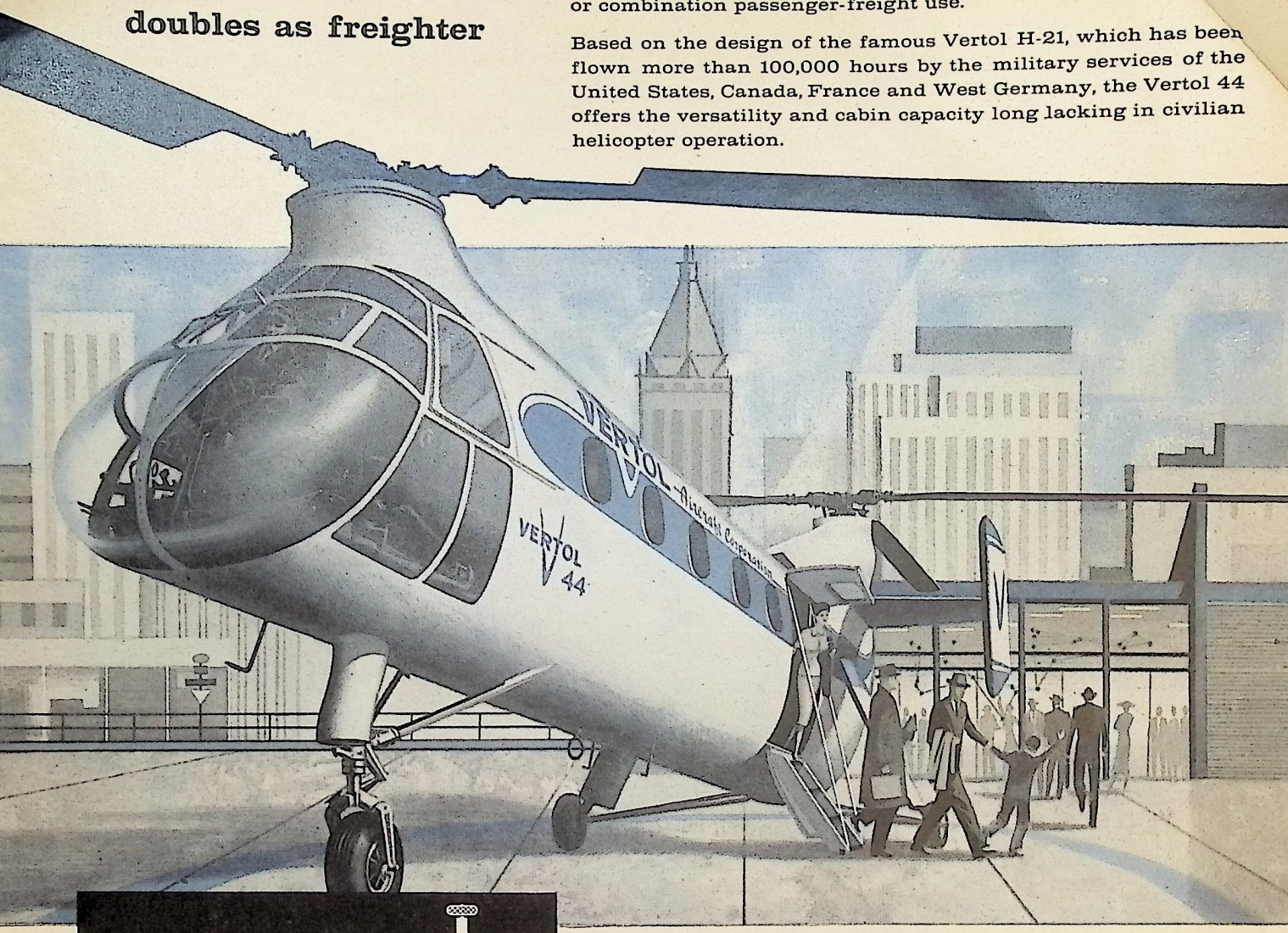

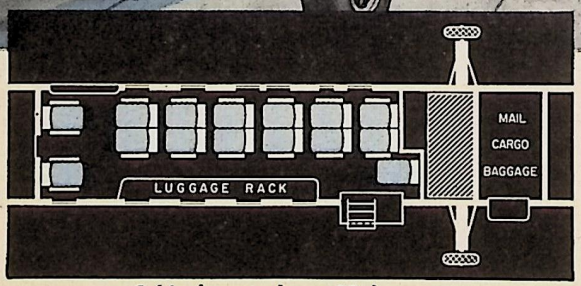

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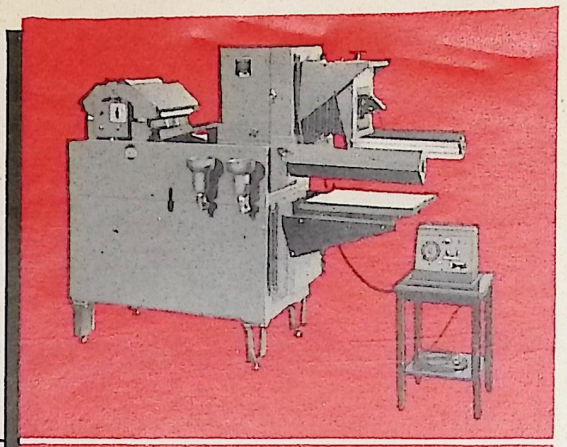

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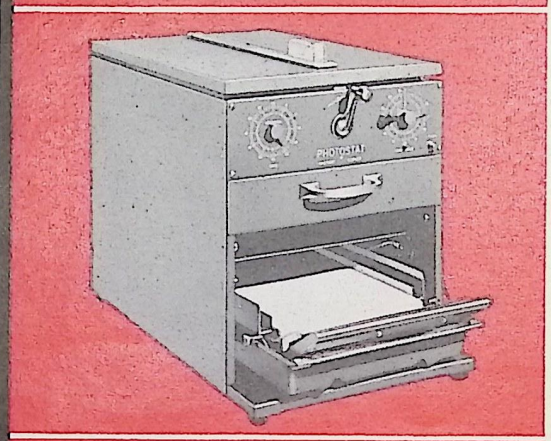

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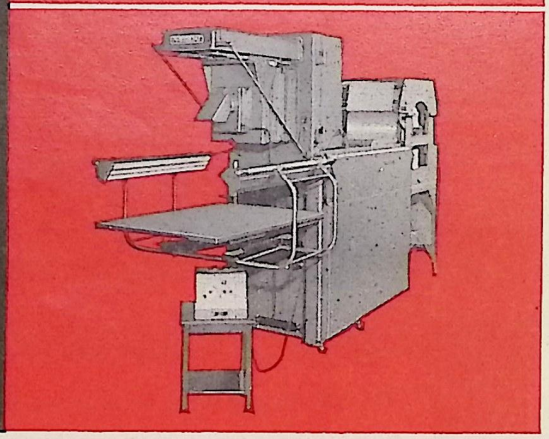

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Story starts on P. 176

place. Science is far more than just the source of the technological advances that raise the standard of living and provide our national security. Science has become a vital part of our culture and society."

And science has a new importance in business, he points out: "A general appreciation of science and technology, and the real understanding of some area of their application, is now essential to a large and growing portion of top positions in business, industry, and government."

Gershinowitz insists that "as the general public is brought to a better understanding of these facts, the status of the engineer both socially and economically is bound to improve. . . ."

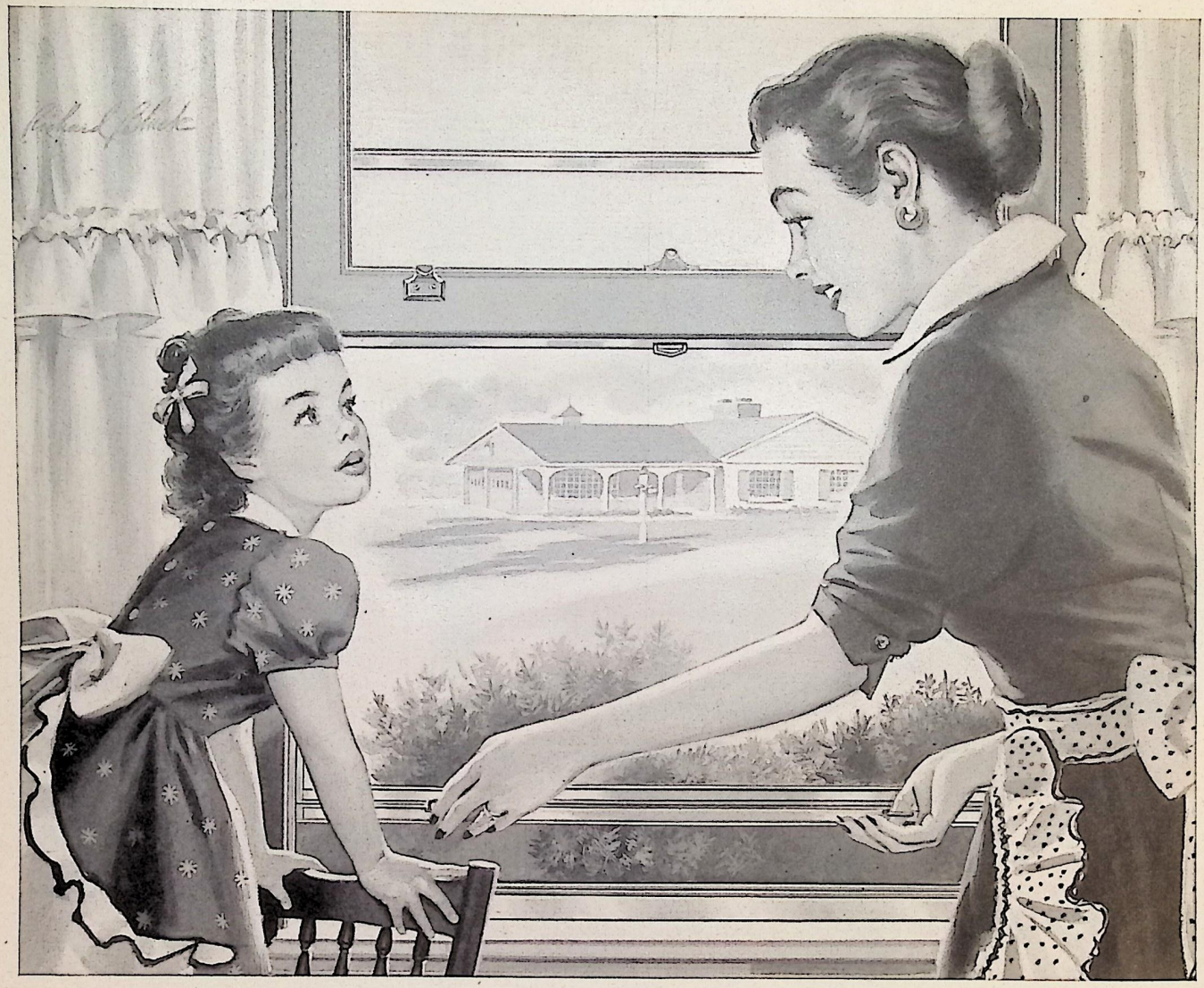
• **Humanities, Too**—This halo that's beginning to glimmer over the natural scientist and engineer is already bright enough to reflect some glory on his colleagues in other fields, including the humanities. The Bell Telephone Co. of Pennsylvania, for example, has been sending many of its managers for advanced training, not to "management" courses or some closely related study, but to a 10-month Institute of Humanistic Studies at the University of Pennsylvania.

Another sign: An influential leader of business thought, Clarence B. Randall, former chairman of Inland Steel, gave a series of lectures at Harvard recently on the businessman and the liberal arts. He called on businessmen to widen their horizons by "the exciting processes of liberal education," which would help them to recognize and discharge their obligations to the community.

• **Laggard Eggheads**—One group seems not to have caught on to this growing appreciation for intellectual attainments—the intellectuals themselves. John W. Gardner, president of the Carnegie Corp. and a leading stimulator of the "great national talent hunt," underscores the point. He notes that U.S. intellectuals—like some earlier minority groups in U.S. society—seem not to have noticed that they have virtually left behind them their "inferior social status."

True, the old suspicion and scorn of the "long-hair," the "double-dome," the "egghead" may be a long time dying in some quarters. But Americans have repeatedly demonstrated that they are nothing if not pragmatic; and any traces

"Mommy, let me do it!"



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When and as read, this advertisement definitely should be construed as a bona fide offer of sale.

OPEN END INVESTMENT

Above statement made in reference to a bottle of Imported O.F.C. Canadian Schenley... with its cork removed. Analysis: O.F.C. means Old Fine Canadian—the *one* for lightness and elegance of flavor. A choice blend of the finest Imported Canadian whiskies. Six years old.

IMPORTED O.F.C. CANADIAN SCHENLEY

Quotation

"Once sampled, immediately preferred for its High-Grade quality, Maturity... offered at an excellent Rate of Exchange."

Active Stock

Sales brisk, indicating a swing that is setting a market trend. Forecast very good, for it is said of O.F.C. that "the world sends nothing finer to America."

Illustrated Prospectus prescribing the proper method of mixing a balanced portfolio of Elegant drinks is available free upon written request from the undersigned, 350 Fifth Avenue (Address Dept. SE-2).

86.8 PROOF CANADIAN WHISKY, A BLEND
SCHENLEY DISTILLERS CO., N. Y. C.

Urgently Required
BRAINPOWER
Story starts on P. 176

of anti-intellectual prejudice holding over from hard-bitten frontier days are likely to give way to the force of necessity.

III. Free to Be Human

It's a necessity that's going to face everyone who's now responsible for any sort of enterprise just as long as he holds that responsibility. The shortage of brainpower will put a high premium on any kind of mechanism that anyone can devise to alleviate it—but it's not a condition that's going to be eliminated.

That becomes quite evident when you look at what's involved. The trouble isn't in discovering the prescription for a remedy—just about everybody who has thought about it agrees what the prescription is. What it calls for is to pour more funds into education, raise the financial and social rewards for the educated people we need, break down barriers to the supply of educated talent—economic barriers that may prevent the farm boy with brains, or others low in the economic scale, from having an equal chance; racial barriers that keep society from making full use of Negro citizens; barriers of prejudice that keep women from advancing.

Yet when you take a deeper look at what goes into this prescription, it's obvious that there will be real difficulties in translating these generalities into daily action—and that these difficulties are going to frustrate us for a long time.

• **Birth Pains of a New Era**—Put in those terms, it all sounds rather grim. But there's another way of looking at it. It doesn't take too much of a mental shake to realize the harassing scarcity of people willing and able to use their heads is only one side of a coin.

Looked at from the other side, the coin shows, for the first time in history, the picture of a society that is forced by its own necessities to treat all of its members as in the fullest sense thinking, imagining human beings. In every past society, sheer physical need has required that a large proportion of the people be reserved for use as beasts of burden, as machines, as attachments for machines, you might say. Even now, much of the world is still struggling to attain those human freedoms already achieved in highly industralized countries.

Yet today we are well into an era that

in building maintenance

you can't buy experience by the gallon

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For low cost, effective maintenance—regardless of the type or size of building—"you can't buy experience by the gallon." The trained inspection, diagnosis and recommendations of the Tremco Man, plus application instruction on the job, assures economy and satisfaction . . . whether the work is done by a contractor or by your own maintenance crew. Is your organization using the Tremco Man's services? The Tremco Manufacturing Company, 8701 Kinsman Road, Cleveland 4, Ohio, or The Tremco Manufacturing Company, (Canada) Limited, Leaside, Toronto, Ontario.

An outstanding opportunity exists for young men, 24-32, to join the Tremco sales organization. For information write Sales Training Division.

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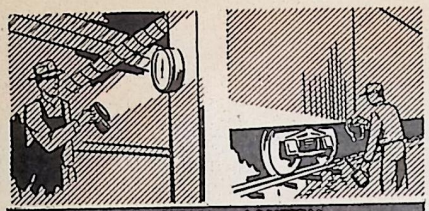
Uniform high quality and longer life are reasons why Burgess batteries are standard equipment in many complex electronic machines of our age. These same qualities, plus engineering know-how, fit Burgess batteries into everyday industrial applications. Illustrated are just a few of Burgess battery applications. Call on Burgess today!



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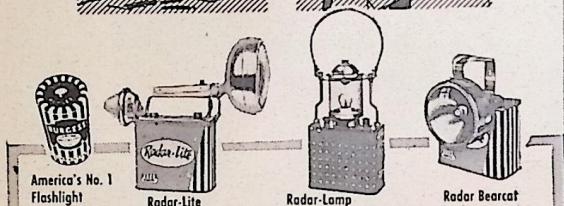

Perfect portable lights for America on the move

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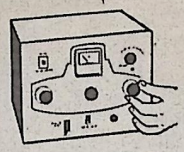
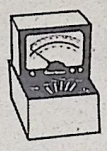


TEST EQUIPMENT



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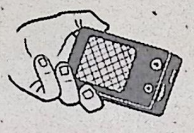

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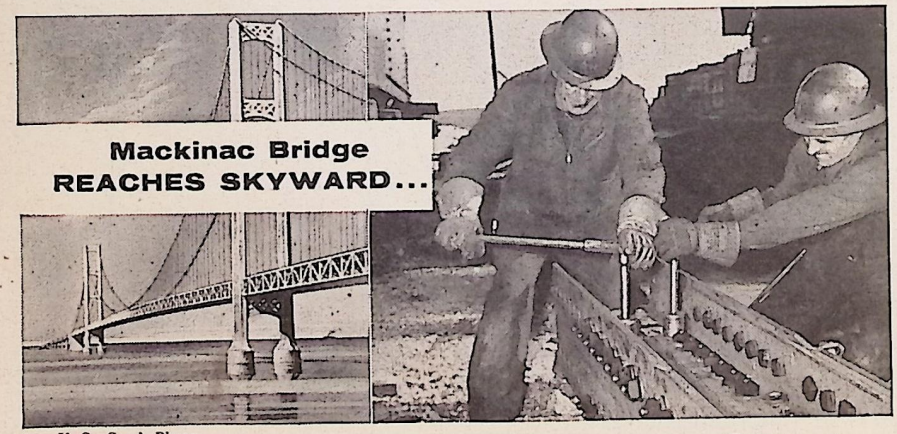

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REACHES SKYWARD...

U. S. Steel Photo

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Mackinac Bridge — five miles of structural beauty and strength — another tribute to the best in engineering skill in men, in tools. Up she goes with men like steelworker Ray Popp and tools like Ray's *Snap-on* Loxocket wrench on the job. Says Ray, "I've used *Snap-on* tools for years — couldn't get along without them."

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Urgently Required BRAINPOWER

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invites everyone, literally everyone, to share the variety and freedom and challenge which in the past a small elite group, a minority of intellectuals and professionals, have always claimed as their own.

• **Spur**—This is today's version of the chronic labor shortage, of the frontier economy, which has been the peculiar characteristic of American society since its beginning—and which, some would argue, is the major reason for its unique accomplishments.

It should be one of the more exciting things in the coming decades to see how the mass of the U.S. population responds to this challenge. Without much preparation, and at a time when the educational machinery is in a shaky state, just about every American is being invited, urged, goaded to develop and use every bit of intelligence, skill, and imagination of which he is capable.

As other industrialized countries develop a similarly complex industrial organization—Britain, say, and possibly Russia (BW—Nov.19'55,p41)—similar shortages of educated talent and a similar priority for brains tend to show up there, too.

• **Changes on the Way**—In the U.S. there are signs that the results of the summons to intellectual battle may be surprising. Already we are a nation of high school graduates—a possibility that few hardheaded men of the 1890s would have been prepared to contemplate.

Sharp changes are beginning to occur in the hierarchy and organization of industry. A recurring theme as BUSINESS WEEK reporters talked to businessmen about these problems was a recognition of the need for business to show more respect for the brains of its employees.

Executive after executive reeled off the same prescriptions for the care and feeding of thinkers that have long been familiar in the brainworkers' old haunts—education and the professions:

• "Provide proper recognition for the professional individual from both economic and non-economic points of view—treat him as a truly professional person with the privileges that such persons have learned to expect. . . ."

• ". . . Insure that these men are not draining off their time and energy in doing a multitude of routine chores of the kind that develop around their assignment."

• ". . . Avoid too tight organization lines and leave people with such

Someone Has to Buy the Product

Sylvia F. Porter, International Financial Columnist for Hall Syndicate, Inc., says:

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Urgently Required BRAINPOWER

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potential considerable leeway for the exercise of individual initiative."

- "Encourage their participation in professional societies and attendance at scientific and technical meetings . . . see that individuals get credit and recognition for findings. . . ."
- "Make industry more and more of an educational institution, equipped to train and upgrade people."
- ". . . Recognize that creativeness is the result of individuality, and that it is essential to understand this individuality rather than to attempt to fit the creative individual into a conformed job pattern."

Over and over, executives stressed the importance of providing educated people with freedom to think and to question, to take responsibility and form independent judgments—and of providing individual recognition and prestige.

Rarer, but more significant, is the view expressed by one Carborundum Co. executive—that these prescriptions are not something peculiar to the professional level of a business, that on the contrary "all phases of the business call for creative men; creativity and initiative are not something to be bottled up among a little group of elite intellectuals."

An MIT dean put the same thought this way: "One of industry's major problems is providing satisfaction to people in it. Since man is essentially creative, business must be organized so that more and more men throughout an organization can derive satisfaction from creativity."

If these men fully mean what they say, industrial and technological development—and the shortage of human talent it creates—may well extend, rather than shrink, the area of human freedom.

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